

507, 435

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



18 SEP 2004

(43) International Publication Date  
25 September 2003 (25.09.2003)

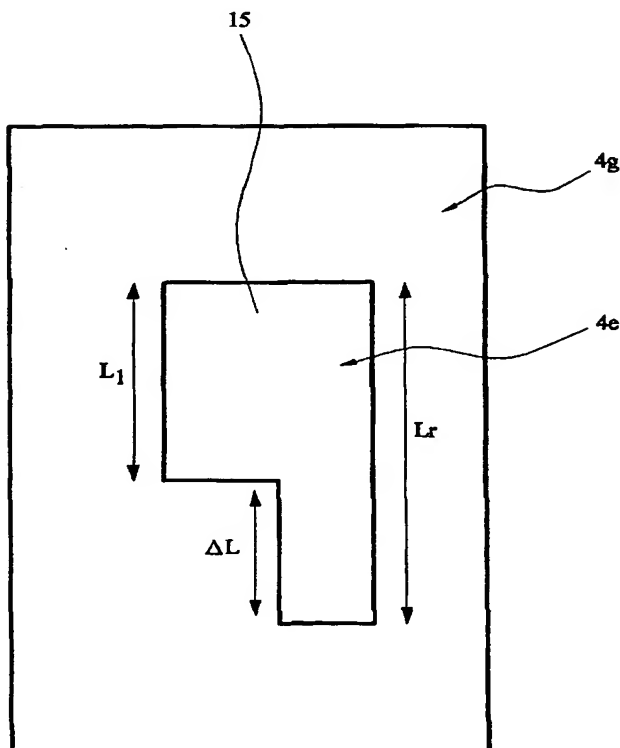
PCT

(10) International Publication Number  
**WO 03/078923 A1**

- (51) International Patent Classification<sup>7</sup>: **G01B 9/02**,  
G01D 5/353, G01N 21/77, 21/45
- (21) International Application Number: **PCT/GB03/01059**
- (22) International Filing Date: **13 March 2003 (13.03.2003)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:  
0206008.5      14 March 2002 (14.03.2002)      GB
- (71) Applicant (for all designated States except US):  
**FARFIELD SENSORS LIMITED** [GB/GB]; Man-  
chester International Office Centre (MIOC), Suite 15A,  
Ground Floor, Styal Road, Wythenshawe, Manchester,  
M22 5WB (GB).
- (72) Inventors; and  
(75) Inventors/Applicants (for US only): **FREEMAN**,  
Neville, John [GB/GB]; 7 Croft Close, Utkinton, Tarpor-  
ley CW6 0XA (GB). **CROSS, Graham** [GB/GB]; Prospect  
House, Little Stainton, Stockton-on-Tees TS21 1HN (GB).  
**RONAN, Gerard, Anthony** [GB/GB]; Farfield Sensors  
Limited, Unit 51, Salford University Business Park, Leslie  
Hough Way, Salford M6 6AJ (GB). **SWANN, Marcus**  
[GB/GB]; Department of Physics, University of Durham,  
South Road, Durham DH1 3LE (GB).
- (74) Agent: **STUTTARD, Garry, Philip**; Urquhart-Dykes &  
Lord, Tower House, Merrion Way, Leeds, LS2 8PA (GB).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE,

[Continued on next page]

(54) Title: OPTICAL INTERFEROMETER



(57) Abstract: The present invention relates to an integrated optical waveguide interferometer including a sensing waveguide with a path of interaction (with the localised environment) having different optical lengths, and to a method for determining the absolute status thereof after the introduction into the localised environment of (or changes in) a stimulus of interest and to a method for determining the absolute calibration status thereof before the introduction into the localised environment of (or changes in) a stimulus of interest.



WO 03/078923 A1



SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,  
VC, VN, YU, ZA, ZM, ZW.

**Published:**

— with international search report

- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INTERNATIONAL SEARCH REPORT

Inter I Application No  
PCT/GB 03/01059

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC 7	G01B9/02	G01D5/353 G01N21/77 G01N21/45
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
IPC 7 G01B G01D G01N		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
EPO-Internal, COMPENDEX, INSPEC, PAJ, IBM-TDB, WPI Data		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 335 793 B1 (CROSS GRAHAM HUGH ET AL) 1 January 2002 (2002-01-01) cited in the application column 5 -column 7 ---	1-32
A	TH. SCHUBERT, N. HAASE ET.AL.: "Refractive-index measurements using an integrated Mach-Zehnder interferometer" SENSORS AND ACTORS A, 1997, pages 108-112, XP002243762 the whole document ---	1-32
A	US 5 521 704 A (THIEL JURGEN ET AL) 28 May 1996 (1996-05-28) the whole document --- -/--	1-32
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
10 June 2003		07/07/2003
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer  Damp, S

## INTERNATIONAL SEARCH REPORT

Inter Application No  
PCT/GB 03/01059

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 35 28 259 A (FERCHER ADOLF FRIEDRICH PROF D) 19 February 1987 (1987-02-19) the whole document ----	1-32
A	DE 198 40 523 A (HEWLETT PACKARD CO) 12 August 1999 (1999-08-12) the whole document ----	1-32
P, X	P. HUA, B.J. LUFF ET.AL.: "Integrated optical dual Mach-Zehnder interferometer sensor" SENSORS AND ACTORS B, 2002, pages 250-257, XP002243763 the whole document -----	1-12, 22-32

## INTERNATIONAL SEARCH REPORT

Inte Application No  
PCT/GB 03/01059

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 6335793	B1	01-01-2002	EP	0939897 A1	08-09-1999
			WO	9822807 A1	28-05-1998
			JP	2001504231 T	27-03-2001
US 5521704	A	28-05-1996	DE	4314488 A1	10-11-1994
			AT	166451 T	15-06-1998
			DE	59405974 D1	25-06-1998
			EP	0623801 A2	09-11-1994
			JP	2828162 B2	25-11-1998
			JP	7198320 A	01-08-1995
DE 3528259	A	19-02-1987	DE	3528259 A1	19-02-1987
DE 19840523	A	12-08-1999	DE	19840523 A1	12-08-1999
			GB	2333834 A	04-08-1999
			JP	11257915 A	24-09-1999